In caries of the spine, while he admits that operations in acute cases are likely to be unsuccessful, he thinks that where there is great pain, this might best be relieved and the abscess opened by trephining the spine posteriorly. In any case it does no harm, and he has seen cases advised to be let alone die in the excruciating agonies of acute compression, a state of things which is certainly a reproach.

As regards the value of the operation there can be no doubt. As an example, he cites a case in which the patient was cyanotic and obviously dying when the arches of the atlas and axis were removed with complete relief. Even where there was extensive concomitant tubercular disease in other viscera, he has seen patients actually improve after this operation.

SOME RECENT CRANIAL SURGERY.

Cranial surgery being still in a transition state, every contribution to its history is of particular interest as affording additional material, by the collation of which definite conclusions may be attained. Operations formerly tabooed on account of the extremely high mortality or great uncertainty attending them, are now admitted to the category of recognized procedures, while others have been rejected and still others are in process of development. The following contributions to cranial and intra-cranial surgery, collected from recent American medical journals, then form a useful part of the material upon which the establishment of the extent and limitations of the cerebral surgery of the future shall be founded.

Dr. C. B. Porter read before the Boston Society for Medical Observation three cases of fracture of the skull which he considered worthy of record, the first two from the severity and extent of the injury from which they recovered, and the third as showing a cure of bullet wound of the brain treated without operation under strictly antiseptic dressings, and all of them as showing the diminution of the danger of cranial surgery by antiseptic methods.

CASE I. *Compound depressed fracture of the skull.*[1]—An unmarried laboring man, æt. 26, was injured presumably by a fast moving railroad train, sustaining a compound fracture of the right side of the skull. The wound of the soft parts extended from the right eyebrow, one inch from the middle line, in a curved direction over the frontal and parietal bones, about one and a half inches from the middle line backward to one and a half inches behind the ear, the flap thus outlined was torn off the skull down to a line with the zygoma and external meatus. Two-thirds of the orbital arch, the external angular process of the frontal bone and the roof of the orbit were attached to this flap, while a portion of the great wing of the sphenoid, the squamous portion of the temporal bone, and portions of the frontal and temporal bones were depressed and still other fragments had been lost entirely. The parts were cleansed and shaved, and under sublimate antisepsis, several small fragments of bone were removed, making it possible to elevate a large depressed area of the temporal; the orbital arch was then wired in place and the wound closed and dressed antiseptically. The patient did well, but four months later, the signs of necrosis being evident, an incision was made and several bits of bone and a large coal cinder removed. From this time the patient made an uninterrupted progress to recovery.

CASE II. *Compound depressed fracture of the skull.*—An unmarried teamster, æt. 20, as the result of a fall down an elevator well, sustained ten scalp wounds over the left parietal region and a depressed fracture of the skull ½ by 1⅛ inches, the fragment cracked through the middle, located to the right of the median line and just behind the coronal suture. Attempts to elevate the fragments failing, they were removed. The operation and the dressing were antiseptic, the patient's temperature never rose above 100.8° in spite of a slight discharge from a wound for a number of days, and the patient was discharged in thirty days.

CASE III. *Gunshot fracture of the skull.*—An unmarried male clerk, æt. 19, sustained a self-inflicted 22 calibre pistol-shot wound in the forehead. The wound was cleansed and dressed antiseptically. During the first ten days he presented various cerebral symptoms from almost complete unconsciousness to right-sided paralysis and incoherence in language. From this time he made marked daily improvement, the paralyzed parts resumed their functions, intelligence returned, the discharge from the wound, always slight, ceased entirely, and twenty-four days from the injury he was discharged from the hospital, practically well.

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[1] Fracture of the Skull. By C. B. PORTER, M.D. (Boston). *Boston Medical and Surgical Journal*, April 10, 1890.

Operation in compound fracture of the skull has been recognized as necessary in order to prevent the painful *sequelæ* of depression and irritation. The propriety of transforming a simple depressed fracture into a compound fracture in order to prevent these dangers has not yet been generally recognized by surgeons. Paralysis, epilepsy, loss of memory, pain in the head, deterioration of the mental faculties, the production of idiocy and insanity, and other consequences of cerebral compression are as likely to result from non-interference in simple as in compound fractures.

The three cases given are examples of the success attending the treatment of compound fractures of the skull and an indication of the impunity to be expected from the conversion of simple into compound fracture under antiseptic precautions. These facts add force to the opinion that antiseptic incision and elevation should be the rule in all compressed fractures of the skull with the removal in addition of irritating spiculæ of bone in cases of comminution.

Operation for epilepsy secondary to injury of the brain case, then, may now be considered as completely within the realm of operative surgery, since the operation in itself with due antiseptic precaution is practically free from danger. A case of this kind[2] is reported by Dr. Beach, of Boston.

CASE IV. *Operation for epilepsy following fracture of the skull.*—A girl, æt. 4, was kicked in the head by a horse, remaining unconscious for nearly a week, during which time some pieces of bone were removed from the wound. The child made excellent progress until after a month convulsions due to suppuration at the wound appeared. After evacuation of the abscess, which was kept open for the next six months, she had no bad symptoms. Four years later she had the first of a series of epileptiform attacks which continued to recur about at monthly intervals. At the age of 9, she had a full epileptic seizure and from this time forth convulsive attacks appeared frequently.

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[2] Compound Comminuted Fracture of the Skull; Epilepsy for Five Years; Operation; Recovery By H. H. A. BEACH, M.D., (Boston). *Boston Medical and Surgical Journal*, April 3, 1890.

Examination at the age of 12 showed a crucial cicatrix in the posterior temporal region, measuring five inches horizontally and four and a quarter vertically. A depression admitting the pulp of the index finger could be easily seen and felt at the point where the lines crossed. The line for the fissure of Rolando crossed the anterior portion of the wound area at a point midway between an inch and a quarter and an inch and a half in front of the sharp edge of bone that defined the depression. The fact of extensive suppuration having occurred made, notwithstanding, accurate localization clearly impossible. The continuance of her symptoms and the renewed frequency of the attacks compelled an affirmative decision as to the justifiability of an exploratory operation.

A semi-circular flap including the cicatrix was raised, disclosing a pulsating point in the center of the depression. An incision here opened into a web of cicatricial tissue containing in its meshes about a drachm of clear fluid; upon entering the tip of the little finger through the incision, brain pulsation could be felt where, before the flap had been removed, all seemed perfectly solid and firm; the finger could not be pushed in any direction owing to the very firm adhesions of the cicatrix to the bony border of the opening. Assuming that the fluid was cystic and located in the dura, whether residual from the old abscess or not, that its shape was flattened from the great pressure to which it had been subjected through cicatricial contraction, and that the irritation caused by its presence might have produced the epilepsy, it seemed desirable nevertheless to search further for a possible spicula of bone or other irritating body. The collapsed cyst then having been dissected from the bone, a finger was swept completely around the internal surface of the skull for a distance of one half an inch from the border of the opening, detaching the adhesion and dura—which could not be separated—from the bone. A sharp spicula of bone was found projecting one-third of an inch from the anterior border of the opening, and it was removed, with the bone to which it was attached, with the bone forceps.

The brain had now retreated from the opening sufficiently to show a mass of firm cicatricial tissue projecting from the surface. This was carefully dissected from the brain, and where it had become consolidated with the cortex enough of the latter was removed to leave a soft velvety surface as nearly like that of the healthy brain as possible. The hæmorrhage, though considerable, was not troublesome. The wound was closed and dressed antiseptically. The patient made an uninterrupted progress to recovery, union by first intention having occurred.

At the date of publication, eight months after the operation, the patient was well and had suffered no recurrence of the convulsions.

Dr. Reeve, of Dayton, Ohio, has reported the following case[3] of operation for epilepsy secondary to fracture of the skull that resembles the foregoing in many respects:

CASE V. *Operation for epilepsy following fracture of the skull.*—A youth, æt. 18, had received, nine years previously, a compound comminuted fracture of the right parietal bone with injury and exudation of brain substance, and in dressing the wound, six or eight pieces of bone were removed, one piece as large as a quarter of a dollar being felt deep in the brain and extracted, while brain substance to the extent of two or three teaspoonfuls was lost. Recovery was retarded by a hernia cerebri which recovered under treatment by pressure.

After two years passed in good health, epileptic convulsions appeared, separated by gradually shortening intervals, until seven years later, but a few days elapsed between them. At this time operation was determined upon. Examination showed, about the middle of the right side of the head, an oblong space with very irregular edges, where bone was entirely absent, measuring two and a half by two inches, and so much depressed below the level that the thumb would lie well in it.

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[3] Case of Traumatic Epilepsy; Operation; Recovery. By J. C. REEVE, M.D., (Dayton, Ohio). *New York Medical Journal*, March 29, 1890.

With antiseptic precautions, a flap including the depression was dissected up easily from the bone but with great difficulty from the scar tissue filling the hiatus. Careful search revealed no projections into the brain and without separating the scar tissue from the brain on account of the abundant hæmorrhage, and the wound was closed. The patient made a good recovery, and after a year and a half has had no recurrence of the epilepsy.

Epilepsy was again the cause of a similar operation[4] by Dr. Keen, at the Jefferson Medical College Hospital. In this case, however, the source of the convulsive affection—not indicated by an external cicatrix—was traced directly to its origin in the cerebral cortex and the operative procedure was directed toward that point.

CASE V. *Treatment of local epilepsy by excision of the hand centre from the cerebral cortex.*—A boy, æt. 6, when fourteen months old, fell a distance of ten or twelve feet, but sustained no obvious injuries. He soon began to develop great irritability and bad temper, and after a few months began to suffer epileptic convulsions, occurring from three to six times a day and continuing during the following four years.

Observation showed that the convulsive movements began with and centered about the right hand and arm. Careful search discovered no scar or other external mark indicating this or any other source for the trouble. Accordingly it was decided to trephine over the motor center for the hand and excise it. The location of the centres having been estimated by means of Wilson's cyrtometer, the scalp was elevated, a button of bone removed with the trephine and the right motor region exposed. The hand center having been definitely located on the cortex by the battery, Dr. Keen excised it. The hæmorrhage having been arrested and suitable drainage provided, most of the bone was reimplanted and the wound closed and dressed antiseptically. Speedy recovery took place and the child was taken home three weeks later.

After eleven months, Dr. Keen reports the patient's condition much improved, although he is not completely cured. The fits have been far less frequent, his intelligence has developed notably and his disposition has undergone marked improvement.

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[4] Removal of the Hand-Centre from the Cortex Cerebri in a Case of Local Epilepsy. By W. W. KEEN, M. D., (Philadelphia). *Medical News*, April 12, and November 29, 1890.

A case[5] of cerebral trouble secondary to a fracture of the skull, and resembling in some respects Cases IV and V was operated upon by Dr. Poore, at St. Mary's Free Hospital for Children, in New York, as follows:

CASE VII. *Operation for hemiplegia following fracture of the skull.*—A girl, æt. 3, at eleven months sustained a depressed fracture of the right side of the skull, which had not been treated. This accident was followed by mental feebleness, exceeding irritability of disposition and paralysis of the left upper extremity in which the left lower extremity also was partially involved. Examination of the head discovered over the right parietal bone a depression, easily admitting the end of the finger and presenting at the bottom a feeling of resistance as if the finger came upon bone, and after the hair had been removed, pulsation was detected over the point of injury.

A scalp flap was dissected up with some difficulty immediately over the point of injury and the opening in the skull was found to be filled with fibrous tissue enclosing a cyst-like cavity from which about a half a drachm of clear fluid was drawn off. No depressed bone was found, and there were no projections into the brain cavity. On account of symptoms of collapse, the exploration was necessarily hasty; the wound was duly closed and dressed antiseptically.

The wound healed kindly and the paralysis of the left extremities immediately began to improve, and nine months later the troubles for which she was treated were almost entirely relieved. They had, however, been replaced by other cerebral changes as manifested by Jacksonian epilepsy.

A suggestive case[6] of cerebral abscess was read before the Society of the Alumni of Bellevue Hospital, by Dr. Charles Phelps, substantially as follows:

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[5] A Case of Traumatic Hemiplegia; Operation. By CHARLES T. POORE, M.D., (New York). *New York Medical Journal*, February 1, 1890.

[6] A Case of Cerebral Abscess of the Brain, with Some Remarks upon Its Relation to Contusion. By CHARLES PHELPS, M.D., (New York). *New York Medical Journal*, March 29, 1890.

CASE VIII. *Cerebral abscess of the brain.*—A man, æt. 34, sustained a compound comminuted depressed fracture of the skull just above the right ear, the dura mater being uninjured. The fragments were elevated and the wound properly treated, healing without difficulty. Less than a month later, however, he began to exhibit alarming cerebral symptoms, suffering severe frontal headache, followed by delirium, somnolence and hemiplegia. On the following day he had almost complete paralysis and anæsthesia of the left side, which, after twenty-four hours more, became more pronounced and were accompanied by involuntary and unconscious evacuations from the bladder and rectum.

The trouble having been diagnosed as either cerebral abscess or rapidly extending softening, the wound was reopened. Incision of the dura mater revealed no pus, but penetration of the brain substance by a probe produced a reddish, purulent discharge. The cavity, thus opened; was washed out and drainage provided and the wound closed. The patient bore the operation badly, respiration ceasing twice, recurring the second time only after tracheotomy. He remained unconscious, however, aud died sixteen hours later.

The autopsy revealed an extensive fracture extending into the base of the skull, but no point upon the external surface of the brain showed any trace of injury or degeneration. The abscess cavity was identified in the right hemisphere and found to be surrounded by quite an extensive area of softening, but it presented no connection with the exterior except the communication accidentally made with the probe during the operation.

There being no injury either of the membranes nor of the superficial cerebral matter, and healthy brain tissue intervening between the altered tissue and the external injury, it follows that the original injury did not proceed from direct violence. The law of dependence of cerebral abscess upon traumatism being accepted there seems to be no other explanation of the condition in this case than contusion by contre-coup.

In three cases[7] reported to the Boston Society for Medical Improvement, Dr. Putnam makes a practical contribution to the study of cerebral localization. In brief they are as follow:

CASE IX. *Sarcomatous tumor of the brain.*—A man, æt. 39, with no signs or history of constitutional disease, presented intense and incessant pains centering in the posterior part of the right temporal region. On one occasion he experienced a seizure, characterized by partial unconsciousness; the left arm was abducted at the shoulder, the elbow being flexed, and slight but regular convulsive movements causing abduction of the arm and possibly slight elevation of the front of the shoulder, were presented. The left wrist and fingers twitched slightly at the same time, the body being so strongly inclined to that side that it could be straightened only with great effort. The left knee-jerk was rather lively and there was no ankle-clonus. The convulsive movements gradually subsided in course of a minute or two, but the patient remained in a stupid condition for some time longer, and as much as five minutes later, the left knee-jerk was still greater than the right. An hour or so later, he was still in a confused state, not knowing where he was, but able to express himself intelligibly.

He suffered from double optic neuritis, very much more intense on the side of the tumor—the right. The left leg and arm became slightly weaker than the right. The headache persisted and the mental dullness increased until, six months after the beginning of the disease, he died.

The autopsy showed the right frontal lobe bulging forward, the projection being especially prominent at the middle of the second frontal convolution, at a spot lying between one and a half and two and a half inches in advance of the pre-frontal sulcus. The surface of the right hemisphere was found pushed across the median line and slightly adherent to that of the left. The optic tracts were excessively flattened by pressure. A section through the right frontal lobe laid bare a grayish, almost translucent mass, mottled and streaked with red, with borders which were well-defined anteriorly, less so posteriorly and of slightly firmer consistency than the surrounding substance. This occupied the entire width of the middle frontal convolution and extended from about the middle of the external convex surface of the frontal lobe back to the pre-frontal sulcus, also encroaching somewhat on the superior and inferior frontal convolutions subcortically. The tumor measured two and a quarter by one and three-quarter inches, the longest diameter following the length of the convolution.

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[7] Three Cases of Cerebral Tumor, with Autopsy. By JAMES J. PUTNAM, M.D., (Boston). *Boston Medical and Surgical Journal,* April 10, 1890.

Knowing that movements at the shoulder are represented in the upper and anterior portion of the motor area and recognizing that the far greater degree of optic neuritis of the right side was, on the whole, confirmatory of the diagnosis of a unilateral tumor, the growth would have been discovered had the skull been opened before death. But as but one characteristic convulsion had occurred and as the other signs were only of moderate localizing value, the operation did not seem justifiable. Moreover it is very doubtful if the tumor could have been removed successfully on account of its size and the difficulty of defining its limits.

An interesting point in connection with the case is that it contradicts the opinion that the second frontal convolution contains facial centers, the face not being involved to any noticeable degree in the convulsion or paralysis.

CASE X. *Two Sarcomatous Tumors of the Brain.*—A man, æt. 58, presenting no signs nor history of constitutional disease, was seized with a violent general convulsion, afterwards considered to be due to the invasion of the membranes of the temporal lobe by the new growth. This was followed by the appearance of aphasia, partly sensory and partly motor, with alexia. Later epileptiform seizures appeared, consisting in tremor of the right arm and leg, and right hemi paralysis of shifting intensity developed, terminating in complete paralysis with contracture. About a month before death, well-marked double optic neuritis was found, but the examination was attended by so many difficulties that it could not be determined on which side it was the more intense. For a number of weeks before his death he lay in coma, scarcely living, the respiration being for a long time excessively feeble and shallow, and occasionally of Cheyne-Stokes character, while during the three days before death the temperature ran up rapidly from 97.5° to 103° F.

On autopsy the entire second left temporal convolution was filled with a softened disintegrated yellowish tissue to within about 3 cm. of its anterior end. The posterior portion of the left parietal lobe was also found to contain a subcortical mass of the new growth of the size of a horse-chestnut, and was extensively softened, mainly from excessive œdema. The convolutions of the Rolandic region, notwithstanding the indications of the convulsive movements of the extremities, were normal.

CASE XI. *Tumor of the brain. Unsuccessful operation due to misleading localizing symptoms* —A man, æt. 51, with no signs or history of constitutional disease. was affected with short attacks of arrest of power of speech without complete loss of consciousness or of power of expression in writing or of comprehension of simple speech or written signs, but preceded by trifling tremor of right hand. He developed a permanent slight hesitancy of speech, with slight paraphasia. Occasional general convulsions would appear without aura. Severe frontal and occipital headache persisted, and with it developed general mental dullness obscuring the more special symptoms.

Five months from the appearance of the earlier symptoms, the first symptom beside the aphasia that could be called localizing occurred, consisting of slight convulsive action of the flexors of the right hand, with tendency to contracture, and a slight similar action of the upper eyelids. These attacks were repeated frequently and in time paresis of the extensors of the right hand began to develop. Optic neuritis was present, about equal in both eyes.

In view of the fact that the patient's first symptom had been a marked loss of speech preceding such general signs as headache, that there had been a recurrent spasm of the hand and fingers, and that no symptoms had occurred which could be confidently interpreted as pointing to any lesion of the parts posterior to the central convolutions, such as loss of muscular or cutaneous sensibility, sensory aphasia, or special disorders of vision—it was concluded that the tumor, which was so evidently present, was in the anterior lobe opposite the lower part of the central convolution. A lesion of the central frontal convolutions and of the motor pyramid tract was excluded by the fact that marked paralysis was absent in spite of the severity of the pressure as indicated by other symptoms.

In accordance with this diagnosis, Dr. Beach operated[8] with careful antiseptic precautions. Elevating a scalp flap, an opening through the skull, one by two inches, was made with the trephine and bone forceps. The dura having been cut, the bulging brain substance was carefully explored with the scalpel to the depth of an inch, producing no undue hæmorrhage, serum nor pus. The four surfaces of the wound were then carefully explored with the finger but nothing abnormal could be discovered except an unusual toughness and thickness of the dura. The wound was closed; the bone not being replaced on account of the cerebral projection. While he reacted well from the operation, he continued to sink and died on the second day thereafter.

The autopsy discovered the tumor at the same level at which it had been sought, but considerably behind the motor area, its posterior edge being limited by the posterior ascending branch of the fissure of Sylvius. The anterior boundary was formed by a small sulcus, leaving the fissure of Sylvius a little behind the anterior extremity of the inter-parietal fissure, which ran down parallel to the fissure of Rolando and was continued by a sulcus opening into the Sylvian fissure. The motor convolutions and the frontal convolutions were perfectly healthy except as regards the effects of pressure and disturbed circulation. The optic tracts were strongly compressed.

These three cases exhibit clearly the difficulties and uncertainties of cerebral localization and the danger of operation where localization has been correct. They do not prove a discouragement to operation, however, for the impunity with which the skull may be opened under proper antiseptic surroundings, as shown by the earlier cases, may safely be said to render exploratory trephining incumbent upon the surgeon in every case where there is a reasonable possibility of benefiting the patient.

JAMES E. PILCHER.

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[8] Operation in a Case of Cerebral Tumor. By H. H. A. BEACH, M.D., (Boston). *Boston Medical and Surgical Journal*, April 10, 1890.